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PARASITIC COPEPODS

FROM THE WILLIAMS GALAPAGOS EXPEDITION

By Charles B. Wilson

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PARASITIC COPEPODS[1]

FROM THE WILLIAMS GALAPAGOS EXPEDITION

By Charles B. Wilson

(Plate XX).

The seventh expedition of the Department of Tropical Research of the New York Zoological Society was known as the Williams Galapagos Expedition. They visited the little group of islands named, which have become biologically famous, and Mr. William Beebe, who acted as Director of Scientific Work, collected quite a number of parasitic copepods. These were forwarded to the present author with the request that they be identified and such notes added as might be of interest. So little is known of the copepod fauna of that region that even a bare list of the species obtained would be well worth publication. In the present instance also the species are themselves of considerable interest and their presence here on the equator in the Pacific Ocean greatly modifies our previous knowledge of their distribution.

Caligus parvus Bassett-Smith.

A single female was obtained from the outside surface of a large brown grouper at Conway Bay, Indefatigable Island, April 1, 1923. The only previous record of this species was made by Bassett-Smith who obtained both sexes from a puffer in Bombay Harbour, India. He said of them . . . "They were often seen actively moving about, and were of a pinkish color, both sexes being equally common." The present specimen still retains in the preservative a decided pinkish hue.

Lepeophtheirus dissimulatus Wilson.

Fifteen specimens, including both sexes, were taken in company with the preceding species upon the same grouper. This species has been found twice before, the original type specimens being taken from a white-spotted serranus, *Epinephelus labriformis*, at Charles Island, another of the Galapagos group. A second lot was obtained from the red grouper, *Epinephelus morio*, at the Bermuda Islands in 1903. These two lots, together with the present one, indicate that the species is fairly common upon the groupers of both the Atlantic and Pacific Oceans in the tropics.

Caligus irritans Heller.

A single female was taken from the mouth of a large-eyed blue fish in Conway Bay, Indefatigable Island. This species was originally described by

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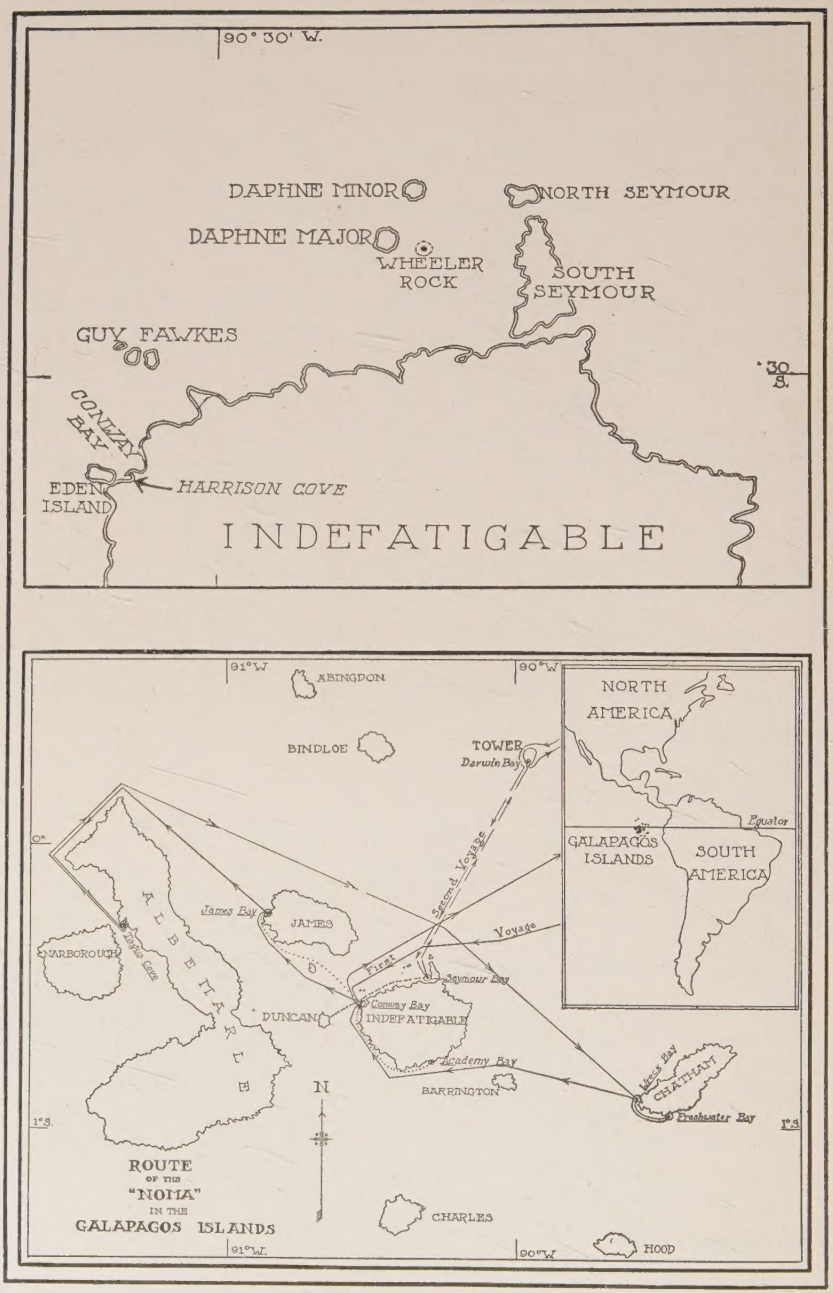

Plate A. SKETCH MAP OF GALAPAGOS ISLANDS
Route of the *Noma*, and details and location of the Archipelago.

Heller from specimens taken from the gills of a grouper off the coast of Brazil. Both sexes were also found by the present author upon the gills of the red-mouthed grunt and the crevalle at Jamaica in the West Indies. This specimen from the Galapagos Islands indicates that the species may be looked for in the tropics of both oceans.

Pandarus satyrus Dana.

Three females and a male were taken from the outside skin of a nine-foot shark captured at night in Seymour Bay, Indefatigable Island. Another female was found upon the skin of a six-foot shark at Tower Island. This parasite had worn a rather deep depression into the skin of its host. A single female was also taken from the outer skin of an eight-foot shark at Seymour Bay, Indefatigable Island. Dana's original type specimens came from a large shark captured south of Tongatabu, one of the Friendly Islands. The U. S. National Museum contains a single lot of 15 females taken from the sides and pectoral fins of a blue shark, *Prionace glauca*, at the Hawaiian Islands. The male was first described from two specimens taken from a large shark in the tropical Atlantic. It seems to be a very common parasite at the Galapagos Islands.

Paralebion elongatus Wilson.

Three females and two males were taken from a nine-foot shark at Indefatigable Island. The types of this species were obtained from a shark caught in Chesapeake Bay in the summer of 1910.

Nessipus costatus sp. nov.

(Plate XX, figs. 9–16).

Host and record of specimens.—Two females without egg strings and one male were taken from a nine-foot shark at Indefatigable Island, April 21, 1923. There is no record of the part of the body of the host, upon which they were found, but if we may judge from the records of other species of this genus the male was probably found on the outside surface or fins, while the females came from the throat or gill cavity. *Costatus*, ribbed, alluding to the frontal plates.

Specific characters of female.—Carapace nearly orbicular, a trifle wider than long; lateral areas of medium width; posterior lobes short, wide and bluntly rounded; cephalic area large; frontal margin evenly rounded, with a small incision at the center; frontal plates wide and distinctly ribbed transversely, a very distinctive character.

Second and third thoracic segments fused and furnished with a single pair of lateral plates, well rounded and reaching behind the posterior lobes of the carapace; no dorsal groove indicating the line of separation between these segments; posterior margin of third segment three-lobed. Fourth segment contracted anteriorly but not forming a neck as in the following species; its two dorsal plates fused with no indication of their dual origin, the combined plate slightly wider than the genital segment and without a trace of a posterior invagination.

Genital segment one-half longer than wide, with straight parallel sides and broad evenly rounded lobes at the posterior corners; posterior invagination wide

and shallow, showing the abdomen; the latter is one-jointed and its posterior margin just reaches the tips of the posterior lobes on the genital segment; anal laminae fairly large, each armed with four plumose setae.

First antennae of the usual pattern; second pair long and slender, with a pad at the base but none on the second joint, the terminal claw without accessory spines. First maxillae similar to those of other species but more evenly rounded, with two small spines at the tip and a minute palp armed with three tiny spines. Second maxillae without accessory spines on the second joint and at the tip. Maxillipeds without a claw but with wart-like processes shutting together as in some species of Pandarus. Swimming legs as in other species, the first pair with five spines on the outer margin of the terminal joint of the exopod, the fourth pair with three spines on the outer margin of the exopod; these spines all taper to a sharp point.

Specific characters of male.—Carapace elliptical, longer than wide, with narrow lateral areas and a large cephalic area; posterior lobes curved inward at their tips; frontal margin more convex than in the female, with a slit-like central invagination; frontal plates distinctly ribbed as in the female; two small elliptical lenses, transparent and placed diagonally just behind and on either side of the tripartite eye. Second, third, and fourth segments about the same length but diminishing regularly in width, the last one wider than the genital segment and nearly twice as wide as long. Genital segment one-fourth wider than long, with prominent conical lobes at the posterior corners. Abdomen one-jointed; annal laminae small and angular, each armed with four plumose setae a little larger than those on the female. Antennae, mouth parts, and legs similar to those of the female.

Color (preserved material).—Both sexes a uniform yellowish-white.

Total length of female 5 mm., of male 4 mm. Carapace of female 2.80 mm. wide, 2.60 mm. long. Carapace of male 2.30 mm. wide, 2.50 mm. long.

Remarks.—The conspicuous transverse ribs of the frontal plates furnish the distinctive character which is the easiest to recognize, but the general makeup of the body and the details of the appendages are considerably different from those of other species.

Nesippus occultus sp nov.

(Plate XX, figs. 1–8).

Host and record of specimens.—One female and nine males were taken from a nine-foot shark at Indefatigable Island, April 21, 1923. As with the preceding species no statement was made in regard to the location of the specimens upon the shark's body. Usually in this genus the males frequent the outside surface while the females are found in the mouth or throat. Ordinarily also only one or two females are found upon a single shark and this would explain somewhat the disparity in the specimens of the two sexes. *Occultus*, hidden, alluding to the abdomen.

Specific characters of female.—Carapace transversely elliptical, one-eighth wider than long; frontal plates distinct and relatively very narrow; frontal

margin evenly rounded without any incision at the center; posterior lobes short, wide, and rather pointed; lateral areas narrow for this genus, cephalic area large.

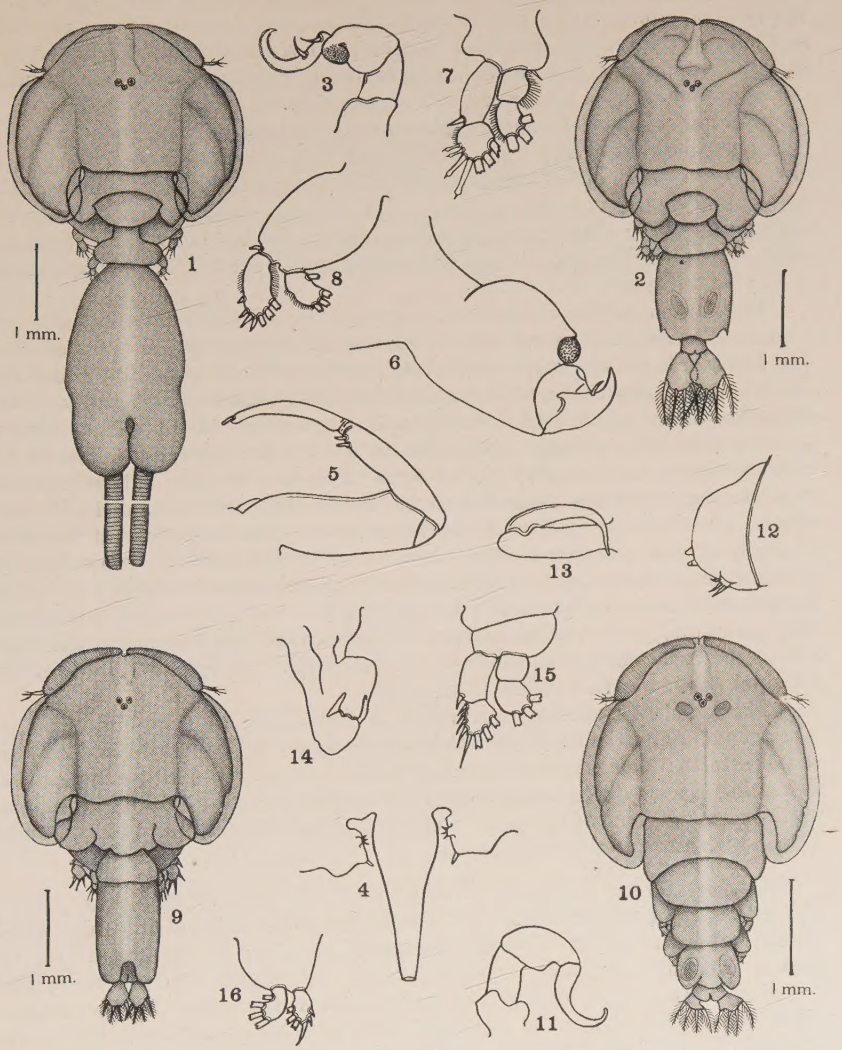

Plate XX. 1, *Nesippus occultus*, dorsal surface of female; 2, dorsal surface of male; 3, second antenna; 4, mouth tube and first maxillae, the latter not in their normal position (see text); 5, second maxilla; 6, maxilliped; 7, first leg; 8, fourth leg; 9, *Nesippus costatus*, dorsal surface of female; 10, dorsal surface of male; 11, second antenna; 12, first maxilla; 13, second maxilla; 14, maxilliped; 15, first leg; 16, fourth leg.

Second and third thoracic segments fused as usual, with only a single lateral plate on either side, but with a fairly distinct dorsal groove between the segments. Fourth segment contracted into a narrow neck anteriorly and expanded posteriorly into a pair of dorsal plates, which are about half the width of those on the second and third segments. Here again the two are so thoroughly fused as to give no evidence of their dual origin either by a longitudinal dorsal groove or by a posterior sinus on the midline.

Genital segment elongate elliptical, twice as long as wide, with the lateral margins somewhat evenly rounded and with a deep posterior sinus, one-fourth of the entire length of the segment; posterior lobes broadly and evenly rounded, overlapping slightly on the midline. Abdomen and anal laminae entirely concealed, the former wider than long with parallel sides, the latter rather large and somewhat triangular, each armed with four plumose setae. Egg strings narrow and twice the length of the body.

First antennae like those in other species; second pair relatively large with a small adhesion pad on the ventral surface at the base of the terminal claw. The latter is large and curved into a half circle, with the concave surface flattened and armed with a row of minute teeth along either margin and with two setae near its proximal end. First maxillae short and wide laminae, more or less angular, with a single short spine at the tip and near the center of the inner margin a minute palp tipped with three tiny spines. These laminate maxillae stand on edge, projecting from the ventral surface parallel with each other. In the figure (4) here given they were cut loose from the ventral surface of the head, the posterior portion of each was turned outward away from the mouth tube, and they were turned onto their sides in order to show their shape. Second maxillae long, the basal joint quite stout, the terminal portion slender and apparently jointed at the center. There are two small spines at the distal end of the basal portion on the inner surface and a tiny claw at the tip of the terminal portion, attached like a fingernail.

This female was evidently securely attached to her host, since one maxilliped was pulled off and the tip of the other was broken. Enough was left, however, to indicate that the maxillipeds of the female are like those of the male. The swimming legs are like those of other species of the genus, but each of the spines on the terminal joint of the exopod of the first legs is swollen at the end, and is tipped with a minute secondary spine.

Specific characters of male.—Carapace relatively wider than in the female and with a slight median incision on the frontal margin; lateral areas also wider, cephalic area the same. Thoracic segments like those of the female with the second and third segments distinctly separated; fourth segment contracted anteriorly into a neck shorter and wider than in the female. The posterior expansion of this segment is no wider than the anterior portion of the genital segment, while in the female it projects considerably on either side.

The genital segment is quadrangular with nearly parallel sides, the posterior corners produced into minute spines, the posterior margin with a convex double curve. Abdomen one-jointed, two-fifths of the width of the genital segment; anal laminae very large, each of them being twice the area of the abdomen and armed with four large plumose setae.

The antennae and mouth parts are like those of the female. The terminal joint of each maxilliped is much swollen until it is as wide as, or wider than, long. It is tipped with a stout claw, strongly curved and armed with a secondary spine near the center of the concave margin. Opposite the base of the claw is a spherical knob over which the tip of the claw shuts down tightly. The surface of this knob is corrugated and anything like a fold of skin, caught between the claw and the knob, is held as if in a vise.

Color (preserved material).—Both sexes a uniform yellowish-white, tinged with brown over the reproductive organs; egg strings light brown.

Total length of female, 6 mm., of male, 5 mm. Carapace of female, 2.60 mm. long, 3 mm. wide. Carapace of male, 2.50 mm. long, 3 mm. wide. Genital segment of female, 2.80 mm. long, 1.50 mm. wide. Genital segment of male, 1 mm. long, 1 mm. wide.

Remarks.—This species resembles Heller's *Nesippus crypturus* more nearly than any other of the described forms, but shows the following specific differences. In *crypturus* the fused second and third thoracic segments are contracted posteriorly into a neck of the same width as that of the fourth segment; here there is no neck at all on the third and fourth segments. In *crypturus* the fourth segment is about the same width and length; here it is twice as wide as long. In *crypturus* the terminal claw of the second antenna is but slightly curved and its lateral margins are smooth; here it is bent into a half circle and each lateral margin is armed with a row of fine teeth. In the second maxilla Heller's species showed a single spine on the outer margin of the second joint at the distal end and the terminal claw tapered to a sharp point. Here there are two spines on the inner margin of the second joint near the distal end, and the terminal claw is bluntly tipped with an accessory spine attached like a toenail.

The types of both these new species of *Nesippus* are deposited in the Department of Tropical Research of the New York Zoological Society.

This is one of the series of scientific papers of the Harrison Williams Galapagos Expedition, under the directorship of William Beebe, sent out by the Department of Tropical Research of the New York Zoological Society. The general account and narrative of the expedition, together with the natural history and photographs of the fauna, are embodied in a volume by William Beebe, published by G. P. Putnam's Sons, under the auspices of the Zoological Society. Its title is "Galapagos; World's End."

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